REMARKS

Claims 14 and 17 were previously canceled. Claims 11, 13 and 25 are canceled in this Response.

Claims 1-10, 12, 15-24 and 26-31 are currently pending.

Claims 1-9, 18-24 and 26-29 are presently withdrawn.

Claim 10 has been amended by reciting hyaluronic acid and atelocollagen as elements of the claim. Support can be found in the Specification at paragraphs [0085] and [0130]. The claim has also been amended by incorporating claims 11 and 13, now canceled, into claim 10. Lastly, the terms "nerve growth factor" and "neurotrophin-3" have been deleted.

Claim 18 has been amended to require an effective amount of the periodontal transplant of claim 10 to regenerate the periodontal tissue. Support for the amendment can be found in the Specification in Example 2.

Claims 19-24 have been amended by deleting the term "regenerating."

Claim 31 has been amended to be independent. Support for the amendments can be found in claim 10.

New claims 32-38 have been added. Support for the new claims can be found in previously presented claim 10 and in claim 10 as currently amended. In addition, support for new claims 32 and 33 can be found in the Specification on page 34, lines 26-27.

No new matter has been entered.

Amendments to the Specification

Applicants have amended the Specification to insert the generic term "atelocollagen" immediately before the trademarked name of the atelocollagen, i.e. TERUPLUG®, which was used in the examples. Applicants have supplied the 2002 description of TERUPLUG® (Exhibit

1) that was provided by the supplier named in the Specification, "Terumo." This description clearly states that the TERUPLUG® product is made of atelocollagen. Applicants have also provided a 2011 product description of TERUPLUG® (Exhibit 2) by Olympus Terumo Biomaterials which also identifies the product as made of atelocollagen. Applicants further supply a December 14, 2008 press release (Exhibit 3) that announces the integration of the biomaterials business of Olympus with the collagen business of Terumo to form Olympus Terumo Biomaterials Corporation. This press release notes on page 2 that Terumo launched TERUPLUG® in 1998. Applicants thus submit that the addition of the general and generic descriptor "atelocollagen" immediately before the trademark TERUPLUG® is not new matter, but merely the generic term for the material, and should therefore be entered into the Specification.

Statement of the Interview

Applicants thank the Examiner and her Supervisor for taking the time for an Interview on August 12, 2011. During the Interview, proposed amended claims served as the basis for a discussion of the prior art. Applicants also discussed the biology behind the instant invention and the biology implicated by the prior art references.

Rejections Under 35 USC § 112, Second Paragraph

The Examiner has rejected claim 10 for lack of antecedent basis for the recitation of the phrase "the regenerated cementum and the regenerated alveolar bone have a periodontal ligament between them and wherein" in lines 6 and 7.

Applicants have amended claim 10 by incorporating claims 11 and 13 into claim 10. Claims 11 and 13 recited that the therapeutic amount of the transplant regenerates cementum (claim 11) or alveolar bone (claim 13). Thus, claim 10 now has proper antecedent support for the phrase "the regenerated cementum and the regenerated alveolar bone have a periodontal ligament between them and wherein." Applicants therefore request removal of the rejection.

Rejections Under 35 USC § 112, Fourth Paragraph

The Examiner has rejected claims 11 and 13 for failing to further limit the subject matter of a previous claim.

Applicants have canceled claims 11 and 13, thereby obviating the rejections.

Rejections Under 35 USC § 102

The Examiner has rejected claims 10-13, 15 16 and 30 as anticipated by Constantino *et al.* (WO 96/39202). The Examiner contends that Constantino *et al.* teach a biocompatible hydroxyapatite formulation that comprises hyaluronic acid and nerve growth factor.

Applicants have deleted reference to nerve growth factor from the claims, thereby overcoming the rejections.

Rejections Under 35 USC § 103

The Examiner has rejected claim 31 as obvious over Constantino *et al.* and further in view of Tsuboi *et al.* As mentioned above, Constantino *et al.* teach a biocompatible hydroxyapatite formulation that comprises hyaluronic acid and nerve growth factor. The Examiner states that Tsuboi *et al.* teach that the neurotrophic factors bone-derived neurotrophic factor (BDNF), nerve growth factor (NGF) and neurotrophin-3 (NT-3) all behave similarly in their effects upon proliferation of mouse periodontal ligament (MPL) cells. The Examiner concludes that the skilled artisan would have found it obvious to modify the teachings of Constantino *et al.* by substituting either BDNF or NT-3 for NGF because Tsuboi *et al.* teach the similarity of effects of these neurotrophic factors. Applicants respectfully traverse.

Applicants note that each and every composition presented by Constantino *et al.* contains hydroxyapatite (HAP). However, HAP particles implanted into furcation defects do not result in regeneration of the lost periodontal structure, including the "connective tissue attachment" which is another term used by those skilled in the art for the periodontal ligament. See Yaegashi *et al.* (1989) Nihon Shishubyo Gakkai Kaishi (March) 31(1):83-99; English abstract attached. In

addition, HAP particles generated ankylosis and peripheral osteoid formation in the HAP particles.

Applicants note that Constantino *et al.* do not specify the size of the HAP particles generated according to the reaction disclosed in the reference. However commercially available HAP particles typically fall within a range of 100 -- 1,000 μm in size. This contrasts with the size of the cementum and periodontal ligament tissues; the cementum is typically 20-150 μm in width, while the periodontal ligament is about 200 μm in width. Furthermore, each HAP particle can act as a "seed crystal" for other HAP particles or for inorganic phosphate that is naturally present *in vivo* and acts to attract osteoblasts which form bone, leading to much larger HAP particles and/or bony structures. Consequently, because HAP binds directly to dentin, HAP particles prevent/disrupt/inhibit the complete generation of the periodontal ligament and cementum during regeneration.

Therefore, because Constantino *et al.* require HAP particles in each and every composition disclosed and because HAP particles prevent/disrupt/inhibit the complete generation of the periodontal ligament and cementum during regeneration, Constantino *et al.* cannot serve as the basis for an obviousness rejection.

With respect to Tsuboi *et al.*, Applicants submit that BDNF, NGF and NT-3 are not interchangeable *in vivo*. Applicants refer to the attached chart (Exhibit 4) summarizing the effects of the neurotrophic factors discussed in the instant Specification. Here, it is clear that while each of BDNF, NGF, NT-3 and neurotrophin-4/5 (NT-4/5) increase proliferation of human periodontal ligament cells, they have significantly different effects on other cell types involved in the periodontal tissue. For example, BDNF and NT-4/5 have no proliferative effect on human gingival epithelial cells (HGEC) while both NGF and NT-3 increase proliferation of this cell type. Importantly, studies conducted in beagle dogs indicate that while treatment with BDNF increases periodontal tissue regeneration, no effect is observed with NFG or NT-3.

The attached micrographs (Exhibits 5 and 6) illustrate this. Exhibit 5 shows the difference in regeneration potential using BDNF, NGF and NT-3. Exhibit 6 is an enlarged and labeled view

of the tooth treated with BDNF and NGF. To summarize, all of the periodontal tissue above the dotted line was removed and that space filled with transplant material containing atelocollagen in combination with either BDNF, NGF or NT-3. The micrographs show the extent of regenerated periodontal tissues that appear above the dotted line after six weeks. Here, it is clear that the BDNF treatment has fully regenerated cementum, a fully regenerated periodontal ligament and regenerated alveolar bone whereas in the NGF treated tooth, regenerated cementum and periodontal ligament is absent, the amount of regenerated alveolar bone is greatly reduced and there is significant invasion of the gingival epithelium.

Applicants also submit Takeda *et al.* (2010) Tissue Engineering: Part A 17: 955-967. This publication shows that similar results are achieved using hyaluronic acid in place of atelocollagen. For example, Figure 5 on page 961 of Taketa *et al.* (2010) contrasts treatment with BDNF and hyaluronic acid with treatment with BDNF and poly(lactic-co-glycolic acid; "PLGA"). As can be seen in Figure 7C - 7E and Figure 8B, cementum and periodontal ligament are fully regenerated in the BDNG and hyaluronic acid-treated subjects.

In view of the above results, Applicants submit that Constantino *et al.*, either alone or in combination with Tsuboi *et al.*, cannot be the basis for an obviousness rejection for claim 31 because a skilled artisan would have no expectation of success in using the HAP particle containing compositions of Constantino *et al.* to obtain the regenerated cementum and periodontal ligament of claim 31. The defects of Constantino *et al.* also prevent this reference to serve as a basis for an obviousness rejection over any of the other amended claims currently pending.

In addition, Tsuboi *et al.* fails to fill the void left by Constantino *et al.* Furthermore, as shown by the evidence presented herein, even if Constantino *et al.* were considered an effective reference, Applicants have shown that Tsuboi *et al.*'s teaching of the similarity/interchangability of BDNF, NGF and NT-3 does not extend to cell types other than periodontal ligament cells. Because multiple cell types are involved in regeneration of periodontal tissue and because BDNF, NGF and NT-3 have different effects on regeneration *in vivo*, the teachings of Tsuboi *et al.* cannot support an obviousness rejection.

In view of the above, Applicants request removal of the rejections.

Conclusion

In view of the above, all of the claims are submitted as defining non-obvious, patentable subject matter. Consequently, Applicants respectfully request removal of the rejections and allowance of the claims.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Susan W. Gorman, Ph.D. (Reg. No. 47,604) at the telephone number of the undersigned below to conduct an Interview in an effort to expedite prosecution in connection with the present application.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Applicant(s) respectfully petition(s) for a one (1) month extension of time for filing a reply in connection with the present application, and the required fee of $130.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.17; particularly, extension of time fees.

Dated: September 9, 2011

Respectfully submitted,

#47,604

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(858) 792-8855
Attorney for Applicant

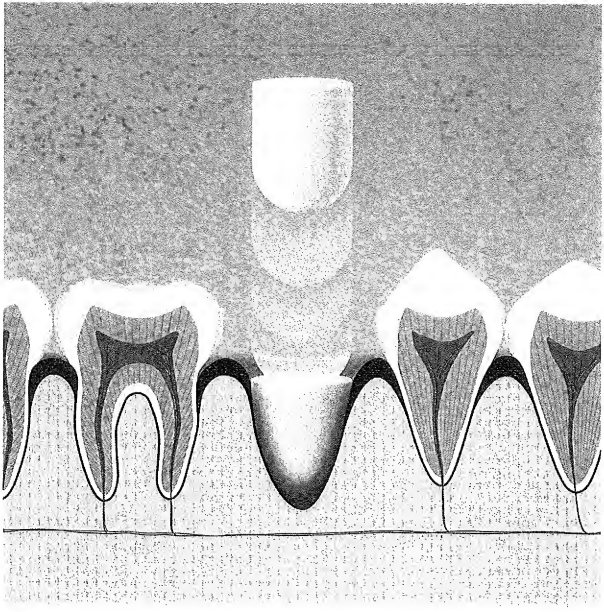
Enclosures: Exhibits 1-6
Yaegashi et al. (1989) Nihon Shishubyo Gakkai Kaishi (March) 31(1):83-99
Takeda *et al.* (2010) Tissue Engineering: Part A 17: 955-967
Takeda K et al. Tissue Eng. 2005 Sep-Oct;11(9-10):1618-29
Kajiya M et al. J Biol Chem. 2008 Jun 6;283(23):16259-67
Mizuno N et al. J Periodontol. 2008 Nov;79(11):2182-9
Xu W et al. J Periodontol. 2006 May;77(5):800-7 [aka Ref. 4: Mizuno et al. of Exhibit 4]

EXHIBIT 1

TERUMO®

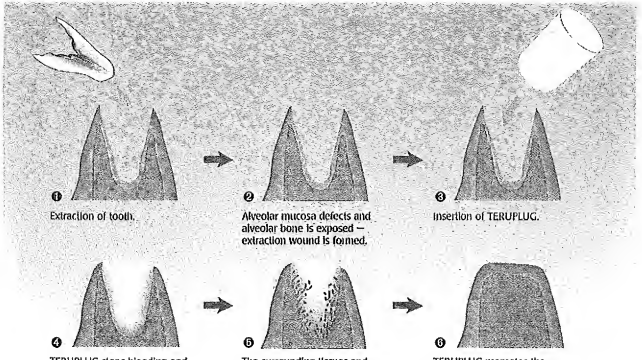
TERUPLUG™

Absorbable Atelo-Collagen Sponge



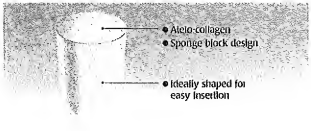
TERUPLUG helps stop bleeding, protects the wound surface and prevents absorption of the alveolar bone. It also promotes the formation of granulation in the recess of the alveolar ridge.

TERUPLUG — made of atelo-collagen to minimize antigenicity — protects the wound and promotes the formation of granulation.



Introduction

TERUPLUG is an absorbable atelo-collagen sponge that is inserted in the extraction wound where alveolar bone is exposed. It protects wounds and promotes the formation of granulation. This product is made of atelo-collagen, to minimize antigenicity, which is cross-linked by heat treatment for biocompatibility. It features a sponge block design and is shaped for easy insertion in the extraction wound.



TERUPLUG consists of between 85 and 95 percent of collagen type I and between 5 to 15 percent of collagen type III. The raw material for the collagen is derived from bovine skin of U.S.A. origin.

Major features

Ready-to-use aseptic product.
- Aluminum package
- Easy to open

Stops bleeding.

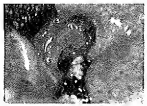
Protects wound surface.
- Prevents food and foreign matter from entering into cavity.
- Prevents wound surface from contamination.
- Alleviates pain and discomfort.

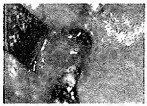
Promotes wound healing.

Establishes a firm base for implants, bridges and dentures.

CASE EXAMPLES

Impacted wisdom tooth

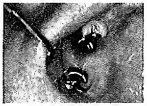

Tooth extracted


TERUPLUG applied


One week later


Two weeks later

Oroantral fistula


First examination

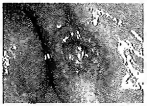

TERUPLUG applied


One week later

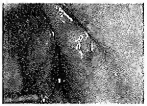

52 days later

Tooth extraction for diabetic patient


Tooth extracted


TERUPLUG applied

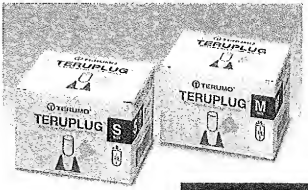

One day later


Four weeks later

Applications

TERUPLUG is ideal for use in the following applications:

- Tooth extraction for implants, bridges and dentures after extraction.
- Hard-to-extract teeth where slow healing is expected
- Impacted teeth, oroantral fistula and re-curage
- Tooth extraction for patients with blood diseases, diabetes, hepatic disease, under dialysis treatment or under chemotheraphy; or those whose occlusive hemostasis is poor due to an acute physical or psychological condition.
- Bleeding after tooth extraction.



TERUPLUGs available

	Reorder number	Dimensions (dia. x length)	No. of packages (per box)
S size	BH-S25	8 x 25 mm	10 pcs.
M size	BH-M25	15 x 25 mm	5 pcs.

TERUPLUG™

Absorbable Atelo-Collagen Sponge

Intended use

Filling of extraction wound to help stop bleeding, promote the formulation of granulation, and protect the wound surface.

Contraindication

This product contains proteins of bovine origin as a raw material and should not be used in those patients who have a known history of hypersensitivity to such materials.

Warnings

Use of this product should be discontinued immediately if the patient displays any symptoms including rashes, hives, or other allergic reactions.

Precautions for use

1. Do not resterilize or reuse. This product is for single use only.
2. Do not use if the package and/or product is damaged.
3. Once unit package is opened, discard if not used immediately.
4. Use of this product in patients predisposed to asthma, hives, or other allergic reactions should be evaluated prior to use.
5. Use of this product in patients who have just given birth or who are nursing a baby should be evaluated prior to use.
6. Use of this product in patients who are or may be pregnant, should only be considered when the expected therapeutic benefit of using this product exceeds the risks. [The safety of this product when used in pregnant patients has not been studied or established.]
7. This product has no antimicrobial properties. Any decision regarding the use of an antibiotic or other therapies when using this product should be made based upon the patient's risk of infection.

Instructions for use

1. If the extraction wound is bleeding excessively, wipe the blood off the wound with gauze or other appropriate material.
2. Where appropriate, curette the granulation in the wound to stimulate the infiltration of the surrounding tissue into the product.
   - If the product is to be used in an oroantral fistula that has been left untreated for an extended time such that the mucous epithelium has covered the fistula, strip the mucous epithelium from the fistula to prepare the wound site for insertion of the TERUPLUG.
3. Use an appropriate size of TERUPLUG to properly fill the wound cavity. Remove the TERUPLUG from the unit package and place it in the wound using clean forceps. Do not touch the TERUPLUG with your hands.
4. Secure the TERUPLUG by stitching or some other means to prevent dislodgment from the wound site.
5. As necessary, any immediate rinsing, gargling, or other appropriate treatment should be considered to minimize the risk of infection.

Storage

- Keep dry.
- Keep away from heat.
- Do not store at extreme humidity and temperatures exceeding the room temperature (30°C/86°F).

Distributor

TERUMO®

TERUMO CORPORATION
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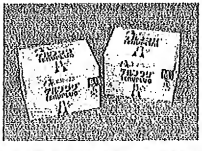
Other offices: •New Jersey •Brussels •Rome •Madrid •London •Goteborg •Paris •Frankfurt

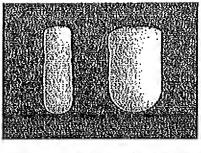
Teruplug

Product Information

Product Description

This product is made of atelocollagen. The atelocollagen is cross-linked by heat treatment to minimize antigenicity for better biocompatibility. The product is in a sponge block configuration and is shaped for easy placement in the extraction wound. It consists of fibrilar and heat-denatured collagen.
(Launched countries: Japan, Korea, Taiwan R.O.C.)





Indication for Use (Human)

Filling of extraction socket to enhance the stop bleeding, formulation of granulation, and protection of the wound surface. (Launched in 1995)
(Launched countries: Japan, Korea, Taiwan R.O.C.)

Application Examples

TERUPLUG is ideal for use in the following applications:

- Tooth extraction for implants, bridges and dentures after extraction.
- Hard-to-extract teeth where slow healing is expected
- Impacted teeth, oroantral fistula and re-curage
- Tooth extraction for patients with blood diseases, diabetes, hepatic disease, under dialysis treatment or under chemotheraphy; or those whose occlusive hemostasis is poor due to an acute physical or psychological condition.
- Bleeding after tooth extraction

Contraindications

This product uses proteins of bovine origin as raw materials and should not be used in those patients who have a known history of hypersensitivity reaction.

Warnings

Use of this product should be discontinued immediately if the patient displays any symptoms such as rash, hives, or other allergic reactions.

Precautions

1. Do not resterilize or reuse. This product is for single use only.
2. Do not use if the package and / or product is damaged.
3. Once unit package is opened, discard if not used immediately.
4. Use of this product in patients predisposed to asthma, hives, or other allergic reactions should be evaluated prior to use.
5. Use of this product in patients who have just given birth or who are nursing a baby should be evaluated prior to use.
6. Use of this product in patients who are or may be pregnant, should only be considered when the expected therapeutic benefit of using this product exceeds the risks. [The safety of this product when used in pregnant patients has not been studied or established.]
7. This product has no antimicrobial properties. Any decision regarding the use of an antibiotic or other therapies when using this product should be made based upon the patient's risk of infection.

EXHIBIT 3

December 14, 2006

New Biomaterial Joint Venture to be Created through Integration of Biomaterials Business of Olympus with Collagen Business of Terumo

Olympus Corporation
Terumo Corporation
Olympus Biomaterial Corp.

Olympus Corporation (Olympus), Terumo Corporation (Terumo) and Olympus Biomaterial Corp. (OBM), a wholly owned subsidiary of Olympus Corporation, have today agreed to incorporate the new Joint Venture specializing in biomaterials. The new Joint Venture will be launched on April 1, 2007.

The Joint Venture will be created through the integration of OBM, which is involved in the areas of biomaterials and regenerative medicine, with the collagen business of Terumo. The aim is to build a biomaterials business through the development of new products in the fields of orthopedics, dentistry, oral surgery, plastic surgery and dermatology, based on the convergence of both companies' technologies.

OBM will be renamed Olympus Terumo Biomaterials Corp. The sales target is ¥5 billion within three years.

In 2005, Olympus and Terumo decided to expand their comprehensive business partnership. Since then the two companies have been discussing a collaborative approach to the development of new medical devices and new markets in several fields, including cardiovascular disease, cancer and bone disease (orthopedic surgery). As part of the process of expanding their business partnership, Olympus and Terumo have agreed to establish a jointly owned corporation as the vehicle for their new business. By creating an integrated business structure specializing in biomaterials, the two companies aim to develop new products based on their technology synergies.

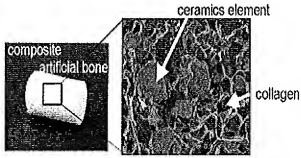
Aims of Joint Venture

In recent years, the rapid growth of the aged population has been accompanied by increases in the incidence of bone fractures and bone disease, including bone tumors. These conditions are generally treated surgically through the use of bone substitute or autogenous bone to regenerate in bony defects. The procedures with bone are less surgically invasive than with autogenous bone and can be expected to provide improvements in the quality of life. These advantages are reflected in the expansion of the bone substitute market.

Natural bone consists mainly of calcium phosphate and collagen. OBM and Terumo have knowledge and manufacturing technologies relating to calcium phosphate and collagen respectively. By applying their combined technologies to the development of bone

substitute, they aim to create new composite bone substitute materials, including composites of ceramics element and collagen, that will more closely resemble natural bone, which is made of. In addition to technology synergies, including the combination of OBM's biomaterials with bio-access technology developed by Terumo, there will also be opportunities for market expansion and other benefits based on marketing synergies. By developing patient-friendly biomaterials, Olympus Terumo Biomaterials aims to create new markets for minimally invasive therapies.

New composite bone substitute material image



Technological Backgrounds of Olympus, OBM and Terumo

Olympus and Olympus Biomaterial

Olympus commenced sales of OSferion, a synthetical bone replacement material based on β-TCP (beta-tricalcium phosphate), in 1999. In 2004 it restructured this area of its business as a wholly owned subsidiary, OBM. In 2005 Olympus acquired Boneceram, a hydroxyapatite bone replacement material, from Sumitomo Osaka Cement Co., Ltd. and Sumitomo Pharmaceuticals Co., Ltd. OBM sells these products in Japan.

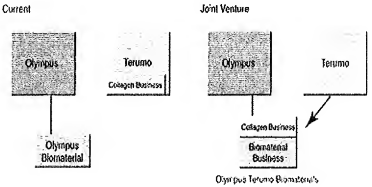
Terumo

The collagen business of Terumo dates from 1993, when it began to supply Terudermis, an artificial dermal graft material used to treat serious dermal and mucosal defects and severe burn wound. Made from collagen, Terudermis supports the formation of dermal tissue through infiltration by the patient's own cells. In 1998 Terumo launched Teruplug, a product designed to accelerate recovery after tooth extraction. Terumo sells these products in Japan and in overseas markets, including the United States, South Korea and Taiwan.

Profile of Olympus Terumo Biomaterials Corp.

President:	Hitoshi Mizuno (currently President of Olympus Biomaterial Corp.)
Head office:	Shinjuku Monolith, 2-3-1 Nishi-Shinjuku, Shinjuku-ku, Tokyo

Activities:	Research and development relating to biomaterials and regenerative medicine, including ceramic bone substitute and collagen, and manufacture and sales of these products
Capital:	¥72,070,000
Ownership:	Olympus 66.6% (192,000 shares), Terumo 33.4% (96,290 shares)
Start of business:	April 1, 2007 (tentative)
Employees:	Approximately 60



Reference

Profile of Olympus Corporation

Head Office:	Shinjuku Monolith, 3-1, Nishi-shinjuku 2-chome, Shinjuku-ku, Tokyo
Establishment:	1919
Paid-in Capital:	48,331 millions of yen
Principal officer:	Tsuyoshi Kikukawa (President)
Consolidated Net Sales:	978,127 millions of yen (End of March, 2006)
Number of Employees:	33,022 (Group, End of March, 2006)
Business activities:	Manufacturing and sales of equipment and devices, including digital cameras, film cameras, IC recorders, medical endoscopes, endosurgery products, endotherapy accessories, biological and industrial microscopes, clinical analyzers, information and communication device, industrial endoscopes, nondestructive testing instruments, printers, barcode scanners, and others.

Profile of Terumo Corporation

Head Office:	44-1, Hatagaya 2-chome, Shibuya-ku, Tokyo
Establishment:	1921
Paid-in Capital:	38,716 millions of yen
Principal officer:	Akira Takahashi
Consolidated Net Sales:	247,048 millions of yen (End of March, 2006)
Number of Employees:	10,825 (Group, End of March, 2006)
Business activities:	Manufacturing and sales of medical products and equipment, including pharmaceuticals, nutritional food supplement, blood bags, disposable medical devices, cardiopulmonary systems, catheter systems, peritoneal dialysis, blood glucose monitoring system, medical electronic, and digital thermometers.

(Note) Forward-looking statements included in this release were determined by Terumo based on the best information available at the time of writing and are subject to potential risks and uncertainties. Therefore, please note that, due to various factors, the actual implementation may differ from what is described here.

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EXHIBIT 4

Summary of Effects of Neurotrophins

***In vitro* and *in vivo* effects of neurotrophins on periodontal tissue regeneration**

	In vitro					In vivo
	Proliferation			Bone/cementum-related protein expression		Periodontal tissue regeneration (beagle dog)
	HPL cells	HGEC	HMVEC	HPL cells	HCEM	
BDNF	↑(Ref.1)	→(Ref.1)	↑(Ref.1)	↑(Ref.1)	↑(Ref.2)	↑(Ref.1)
NGF	↑(Ref.4)	↑(Fig.1)	↑(Ref.4)	↑(Ref.4)	—	→(Fig.2)
NT-3	↑(Fig.1)	↑(Fig.1)	—	—	—	→(Fig.2)
NT-4/5	↑(Ref.3)	→(Ref.3)	—	↑(Ref.4)	—	—

HPL cells: human periodontal ligament cells
HGEC: human gingival epithelial cells
HMVEC: human microvascular endothelial cells
HCEM: human cementoblasts

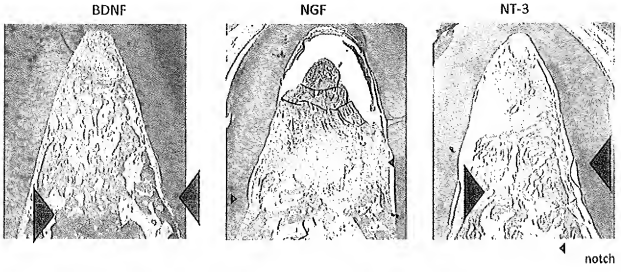
↑ : enhance
→ : no effect
— : unknown effect

Ref.1 : Takeda K et al. Tissue Eng. 2005 Sep-Oct;11(9-10):1618-29.
Ref.2 : Kajiya M et al. J Biol Chem. 2008 Jun 6;283(23):16259-67.
Ref.3 : Mizuno N et al. J Periodontol. 2008 Nov;79(11):2182-9.
Ref.4 : Mizuno N et al. J Periodontol. 2006 May;77(5):800-7.

Red arrows: advantageous effects of BDNF compared to other neurotrophins
Blue arrows: unpublished data

EXHIBIT 5

Difference in Regeneration Potential



Among BDNF, NGF and NT-3, BDNF promoted periodontal tissue regeneration the most.

EXHIBIT 6

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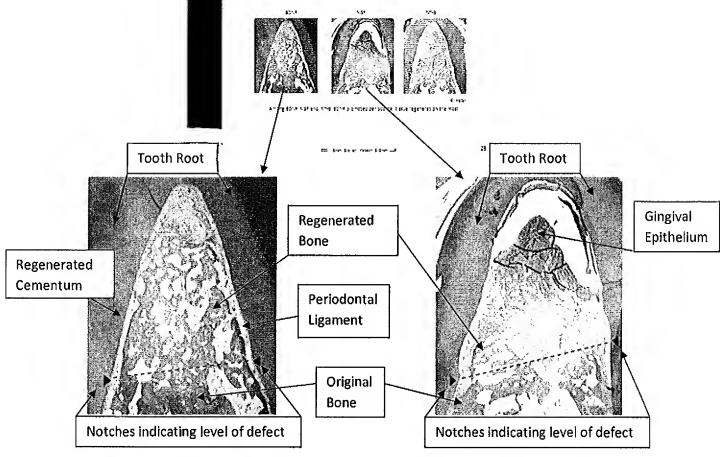
Difference in Regeneration Potential



Description of Slide 28: Histology of Differences in Regeneration Potential of BDNF, NGF and NT-3

This slide illustrates histologically the differences in periodontal tissue regeneration potential of BDNF, NGF and NT-3. The furcation (fork) defect was created by opening a flap in the gingiva, locating and removing the bone and other tissue between the roots of the tooth with a burr, notching the tooth at the level of the defect, filling the space with a gel containing either atelocollagen with BDNF, NGF, or NT-3 and then closing the gingival flap.

Results with BDNF after six weeks indicate periodontal regeneration of bone, cementum and periodontal ligament with little to no gingival epithelium apical invasion into the defect site (See Figure on left above). This is in contrast to the effect with NGF (See Figure on right above), where the amount of regenerated periodontal tissue is substantially less due to the apical invasion of gingival epithelium.

NT-3 (See original slide) demonstrates an intermediate response with respect to periodontal tissue regeneration demonstrating partial defect filling.